

Quality Assurance Project Plan

Canaveral ODMDS Dredged Material Erosion Rate Study

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Table of Contents

Section	Page
A: Project Management	1
B: Measurement/Data Acquisition	5
C: Assessment/Oversight	8
D: Data Validation and Usability	9
References	10

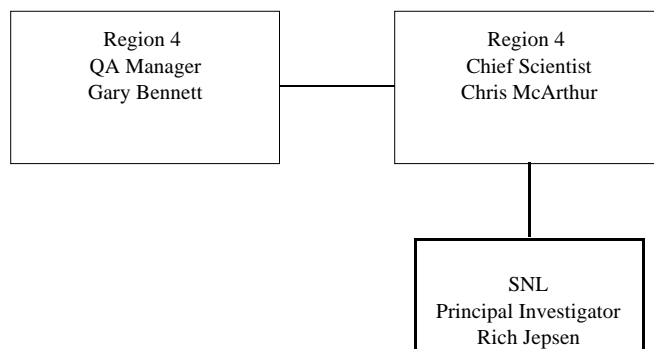
Distribution List

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PROJECT MANAGEMENT

A4: Project/Task Organization

In the present project, we will determine sediment bulk properties as a function of depth and erosion rates as a function of depth and shear stress for 4 sites at the Canaveral Ocean Dredged Material Disposal Site and relate these erosion rates to bulk density and consolidation time. Chris McArthur is responsible for overall project management and for the field collection activities. Dr. Rich Jepsen of SNL will manage the laboratory studies. Other SNL staff will assist in the laboratory studies. The following chart summarizes the task organization.



A separate Quality Assurance Project Plan (QAPP) has been prepared by Sandia National Laboratories (SNL) for the laboratory portion of the project.

A5: Problem Definition/Background

The U.S. Environmental Protection Agency (EPA) has the responsibility under Section 102 of the Marine Protection Research and Sanctuaries Act (MPRSA) for the management and monitoring of Ocean Dredged Material Disposal Sites (ODMDS). The Canaveral ODMDS was designated by EPA in 1990 for disposal of dredged material from the U.S. Navy Trident Basin and Entrance Channel, the Port of Canaveral facilities, and the Corps of Engineers Civil Works Projects at Canaveral. Concurrent with the site designation in 1990 a Site Management and Monitoring Plan (SMMP) was developed. This plan is currently in the process of revision. A main component of site monitoring is the determination of the short-term and long-term fate of materials disposed in the marine environment. Concern has been raised regarding the magnitude and extent of disposed dredged material dispersal outside of the ODMDS boundaries and the potential for disposed dredged material impacting potential future offshore sand sources for beach renourishment. Additionally, a quantitative analysis is needed to provide an estimate of the long term capacity of the disposal site. Close to 1 million cubic yards of material are disposed of at the ODMDS every year. A significant portion of this material comes from the entrance channel where the sediments have been classified as stiff clays and silts, with horizons of very fine silty sand, shell fragments, and organics.

Numerous studies prior and subsequent to site designation have indicated that the ODMDS is a dispersive site for fine grained material and as a result dredged material may extend well beyond the designated site boundaries. However, adequate site specific information is not available to allow for a conclusive and quantitative statement regarding sediment transport from the ODMDS. In order to address this issue, the proposed work is intended to collect site specific information regarding the erodibility of dredged material disposed at the Canaveral ODMDS. Parameters calculated from the proposed work can be used in existing numerical models to provide quantitative estimates of the sediment transport occurring within and near the ODMDS. This in turn can be used to effectively manage the Canaveral ODMDS to minimize environmental impact.

A6: Project/Task Description

The objective of the proposed work is to investigate the erodibility of dredged material disposed at the Canaveral ODMDS as a function of shear stress and bulk density.

EPA Region 4 will collect and ship 3 samples of sediment representative of disposed dredged material to Sandia National Labs (SNL). An additional sample will be collected by U.S. Army Corps of Engineers personnel from disposal barge. Each sample will contain 20 gallons of sediment. SNL will determine 1) erosion rate as a function of bulk density and shear stress and 2) bulk density and critical shear stress as a function of depth. The tests will be performed at intervals of approximately 2, 10, and 60 days of consolidation. This will be done for each sediment sample. If it is determined that consolidation is still occurring at 60 days, then a 120 day consolidation/erosion test will be performed. If consolidation is not still occurring at 60 days, then an intermediate time between 0 and 60 days will be selected for the final analysis. Additionally, SNL will determine bulk density, particle size, mineralogy and organic carbon for each sediment sample.

SNL will provide an intermediate report that includes all tests up to the 60 day consolidation. A final report will be submitted within 180¹ days after receipt of samples. The final report will include at a minimum a description of all procedures and methods and the results for bulk properties, erosion rates and critical shear stress. The report will include at a minimum tables and figures showing 1) bulk density as a function of depth, 2) erosion rates as a function of depth for the range of shear stresses, 3) erosion rates as a function of bulk density for the range of shear stresses, and 4) critical shear stress as a function of bulk density. The final report will be supplied as hard copy original and two copies. In addition, an electronic version of the final report will be supplied in electronic format (Word Perfect, Microsoft Word 97, or Adobe PDF) on CD.

A7: Data Quality Objectives for Measurement Data

To achieve the project's overall data quality objectives, measurements will be made for characterization of sediment bulk properties and erosion rates. The bulk properties to be measured by SNL have been chosen based on previously determined field and laboratory work (McNeil et al, 1996; Taylor et al, 1996; Jepsen et al, 1997; and Roberts et al, 1998). The parameters to be measured in this study are listed in Table A-1.

Table A-1

	Definition	Units	Detection Limit	Int. Consistency
Bulk Density, ρ_b (wet/dry weight)		g/cm^3	Same as water content	$\rho_w < \rho_b < 2.6\rho_w$
Grain Size	Volume weighted distribution including median and mean size	μm	32 size ranges per sample	$1\mu\text{m} < \text{Grain Size} < 900\mu\text{m}$
TOC	Total Carbon minus Carbonates	% of total sample	0.1%	NIST Ref. Mat. 44% 1%
Water Content		none	0.1g in sample weight ranging from 10 to 50 g	$0 < W < 1$
Mineralogy	Minerals Present	none		
Erosion Rate	$E = \Delta z/T$	cm/s	$\Delta z > 0.5\text{mm}$ $T > 15\text{s}$	none

M_w = wet weight of sample

M_d = dry weight of sample

Δz = amount of sediment eroded

T = time

Additional discussion of the quality objectives and criteria for measurement of data can be found in the SNL QAPP.

A8: Special Training Requirements/Certification

Sample collection activities aboard the OSV Anderson will be conducted under the direction of an EPA certified Chief Scientist.

Training requirements for laboratory personnel are discussed in the SNL QAPP.

A9: Documentation and Record

Field Operation Records

Sample collection records will be recorded and maintained by the EPA Chief Scientist. Documentation will be recorded in a survey log book and reported in the Survey Report. Documentation will include: names of persons on survey, sample numbers, sample station locations, equipment used, climatic conditions, and unusual observations.

Chain-of-custody will follow procedures described in the U.S. EPA Region 4 document, "Environmental Investigations Standard Operating Procedures and Quality Assurance Manual."

Laboratory Operation Records

Laboratory and data handling records and reporting are discussed in the SNL QAPP.

Measurement Acquisition

B1: Sampling Process Designs

B1.1: Purpose/Background

Erosion rates will be measured as a function of shear stress and depth for each of four samples. Sediment bulk properties will also be measured for each of the four sites. Core densities will be determined by measurement of water content. Other bulk properties of the sediments (particle size distribution, organic content, and mineralogy) will be measured using samples from a homogeneous mixture of each of the four sites. All measurements to be taken (Table A-1) are classified as critical measurements.

B1.2 Scheduled Project Activities

Sample collection will occur during the first week of October 2000. Sample collection is expected to be completed within one day. Samples will be shipped via 3 day express shipping to SNL in 3.5 gallons buckets. Following homogenization of the samples, the samples will be poured into consolidation tubes. Tests will be performed at intervals of approximately 2, 10, and 60 days of consolidation. This will be done for each sediment sample. If it is determined that consolidation is still occurring at 60 days, then a 120 day consolidation/erosion test will be performed. If consolidation is not still occurring at 60 days, then an intermediate time between 0 and 60 days will be selected for the final analysis. Additionally, SNL will determine bulk density, particle size, mineralogy and organic carbon for each sediment sample.

The work schedule is as follows:

	October	February	March
Measurements of Bulk	-----®		
Properties and Erosion Rates			
Preparation of Final Report			-----®

B1.3: Sampling Design

Method Descriptions: Two samples within the ODMDS boundaries will be attempted immediately following disposal. Dredged material disposal operations will be monitored and disposal locations recorded. Within minutes of disposal, sampling at the disposal location will begin. The remaining dredging area sample (entrance channel and harbor) stations will be sampled and examined. After visual examination the final sample station

will be selected for additional sampling. Approximately 20 gallons of sample will be required at each of 3 stations. Sampling will utilize the Young Grab (modified Van Veen) or Gray O'Hara Box Corer.

Method Rationale: Sampling following disposal was selected to obtain a sample representative of disposed dredged material after removal of fines during descent. One sample from future dredging areas will also be selected. The dredging areas will be examined for characteristics of sediments unsuitable for transport modeling by conventional means (cohesive silts and clays). Based on this examination a final sample station will be selected for collection. Sampling will utilize either the Young Grab (modified Van Veen) or Gray O'Hara Box Corer to obtain maximum sample volume and depth penetration. The two devices will be evaluated during sampling to determine which provides best results.

B2: Sampling Methods Requirements

Sampling methods will follow procedures discussed in the U.S. EPA Region 4 document, "Environmental Investigations Standard Operating Procedures and Quality Assurance Manual." Approximately 20 gallons of sediment from each of the three sites will be retrieved and shipped to the laboratory at SNLs Carlsbad Operations for further analysis and study. Sample locations will be determined utilizing Differential GPS. Sampling will utilize either the Young Grab (modified Van Veen) or Gray O'Hara Box Corer to obtain maximum sample volume and depth penetration. In order to obtain 20 gallons of sediment per station approximately 3 drops of the box corer or 6 drops of the Young Grab will be required (assuming successful grabs). Samples will be placed in 3.5 gallon buckets for shipment (7 buckets per sample). Each bucket will contain approximately 3 gallons of sediment (85% full). The clear supernatant above the sediment-water interface will be decanted from the sampling device or bucket.

The sampling device will be cleansed with sample or analyte-free water between sampling locations in accordance with procedures for "classic parameters." Samples will only be analyzed for physical properties and total organic carbon and therefore special procedures are not required.

B3: Sample Handling and Custody Requirements

Sample handling and chain-of-custody will follow procedures discussed in the U.S. EPA Region 4 document, "Environmental Investigations Standard Operating Procedures and Quality Assurance Manual." Samples will be shipped in 3.5 gallon containers via 2 to 3 day delivery with no other special shipping requirements.

B4: Analytical Methods Requirements

Analytical methods are discussed in the SNL QAPP.

B5: Quality Control Requirements

Although great care will always be taken, quality control will be performed routinely during sampling and measuring. Field QC procedures are discussed in the U.S. EPA Region 4 document, "Environmental Investigations Standard Operating Procedures and Quality Assurance Manual." Positioning control will be under the direction of the Captain of the OSV Anderson. Laboratory QC procedures are discussed in the SNL QAPP.

B6: Instrument/Equipment Testing, Inspection and Maintenance Requirements

Laboratory procedures are discussed in the SNL QAPP.

B7: Instrument Calibration and Frequency

Laboratory procedures are discussed in the SNL QAPP.

B8: Inspection/Acceptance Requirements for Supplies and Consumables

Laboratory procedures are discussed in the SNL QAPP.

B9: Data Acquisition Requirements (Non-direct Measurements)

Data that can be used for comparison is that already collected and published by the current research group at SNL.

B10: Data Management

Data and information will be directly entered and kept in laboratory composition books or by a workbook that has been developed to record erosion rate measurements.

Data will be processed, compiled, and analyzed both manually and by specific computer software. The software to be used will be Microsoft Excel and Synergy KaleidaGraph. These software programs will essentially assist in simple calculations and graphing procedures.

Assessment/Oversight

C1: Assessments and Response Actions

The project will undergo peer review following completion. Additional assessment actions are discussed in the SNL QAPP.

C2: Reports to Management

For field sampling, a survey report will be prepared by the Chief Scientist within 30 days of completion. The report will summarize survey activities and any problems encountered or deviations from the survey plan / QAPP. The survey report will be submitted to Ken Potts, OSV Anderson Project Officer and to EPA management (Section and Branch Chiefs).

For both the laboratory components of this project, the following will be provided by SNL and eventually incorporated in the final project report.

- 1) Summary of Operations
- 2) Alterations in the project design or methods from those described in the QAPP
- 3) Discussion of whether QA objectives were met and the resulting impact on decision making and technical conclusions
- 4) Limitations and use of the measurement data
- 5) Overall precision, and completeness
- 6) Copies of corrective actions and follow up

1), 2) and 3) will be distributed to the EPA project officer for review immediately after the field project is completed. All of the above will be incorporated in the final project report.

Data Validation and Usability

D1: Data Review, Validation and Verification Requirements

D1.1 Sample Design, Collection and Handling

Each sample will be checked for conformity with the project specifications with regard to location, collection procedure and handling. Any deviations will be noted and evaluated. Checks on the identity of the sample (proper labeling and chain-of-custody records) as well as proper storage conditions will be made. Sample container integrity will be validated upon receipt by SNL.

D1.2 Analytical Procedures

Laboratory procedures are discussed in the SNL QAPP.

D2: Validation and Verification Requirements.

Laboratory procedures are discussed in the SNL QAPP.

D3: Reconciliation with Data Quality Objectives.

Results will be evaluated with respect to project objectives, completeness in measurement acquisition, and data validation. All of the above must be satisfied for the DQO. Deficiencies will result first in an attempt to repeat the measurements. If attempts to repeat the measurements do not satisfy the DQO, then the project objectives must be re-evaluated or modified.

References

U.S. EPA Region 4, 1996. "Environmental Investigations Standard Operating Procedures and Quality Assurance Manual." Athens, GA.

Sandia National Laboratories, 2000. "Quality Assurance Project Plan: Canaveral ODMDS Dredged Material Erosion Rate Analysis." Prepared for U.S. EPA Region 4 Water Management Division. Atlanta, GA.